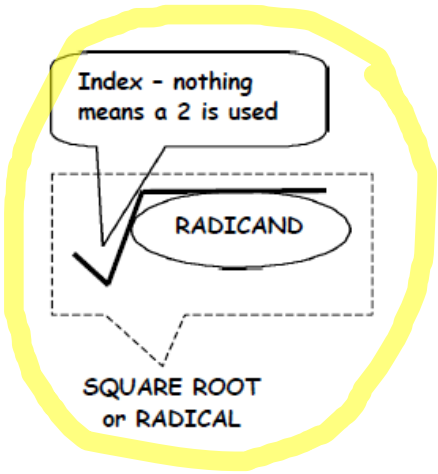
4.3 Simplifying Radicals

Number	Square
1	$1^2 = 1$
2	$2^2 = 4$
3	$3^2 = 9$
4	$4^2 = 16$
5	$5^2 = 25$
6	$6^2 = 36$
7	$7^2 = 49$
8	$8^2 = 64$
9	$9^2 = 81$
10	$10^2 = 100$



Perfect Square	Square Root
1	$\sqrt{1} = 1$
4	$\sqrt{4} = 2$
9	$\sqrt{9} = 3$
16	$\sqrt{16} = 4$
25	$\sqrt{25} = 5$
36	$\sqrt{36} = 6$
49	$\sqrt{49} = 7$
64	$\sqrt{64} = 8$
81	$\sqrt{81} = 9$
100	$\sqrt{100} = 10$

A perfect square is a number that when you find the square root, you do not get a decimal answer (you get a whole number for an answer). Examples are #1,4,9,16,25)

Simplifying Square Roots

Simplifying Square Roots

STEPS	EXAMPLE 1 $\sqrt{8}$	EXAMPLE 2 $\sqrt{63}$	EXAMPLE 3 $\sqrt{162}$
A) Rewrite the radicand as a product of the greatest perfect square and its coinciding factor	A) $\sqrt{8} = \sqrt{4 \bullet 2}$	A) $\sqrt{63} = \sqrt{9 \bullet 7}$	A) $\sqrt{162} = \sqrt{81 \bullet 2}$
B) Split the two factors apart	B) $\sqrt{4 \bullet 2} = \sqrt{4} \bullet \sqrt{2}$	B) $\sqrt{9 \bullet 7} = \sqrt{9} \bullet \sqrt{7}$	B) $\sqrt{81 \bullet 2} = \sqrt{81} \bullet \sqrt{2}$
C) Simplify the perfect square under the square root.	C) $\sqrt{4} \bullet \sqrt{2} = 2\sqrt{2}$	C) $\sqrt{9} \bullet \sqrt{7} = 3\sqrt{7}$	C) $\sqrt{81} \bullet \sqrt{2} = 9\sqrt{2}$

Example : $\sqrt{8}$

Simplifying Square Roots

STEPS	EXAMPLE 1 $\sqrt{8}$
A) Rewrite the radicand as a product of the greatest perfect square and its coinciding factor	A) $\sqrt{8} = \sqrt{4 \bullet 2}$
B) Split the two factors apart	B) $\sqrt{4 \bullet 2} = \sqrt{4} \bullet \sqrt{2}$
C) Simplify the perfect square under the square root.	C) $\sqrt{4} \bullet \sqrt{2} = 2\sqrt{2}$

Example 2:

$\sqrt{63}$

$\sqrt{9 \cdot 7}$

$\sqrt{9} \cdot \sqrt{7}$

$3 \cdot \sqrt{7}$

$3\sqrt{7}$

Example 3: $\sqrt{162}$

$\sqrt{162}$

$\sqrt{81 \cdot 2}$

$9\sqrt{2}$

1
4
9
16
25
36
49
64
81
160

1 Can this number be simplified?

A Yes

B No

$\sqrt{10}$

(For another question, go to the next page.)

2 Can this number be simplified?

A Yes

B No

$\sqrt{27}$

Simplify the following square roots.

1) $\sqrt{27}$ 2) $\sqrt{32}$ 3) $\sqrt{125}$ 4) $\sqrt{128}$

5) $\sqrt{600}$ 6) $\sqrt{80}$ 7) $\sqrt{108}$ 8) $\sqrt{75}$

ANSWERS

Simplify the following square roots.

1) $\sqrt{27}$ $3\sqrt{3}$ $(\sqrt{9}\cdot\sqrt{3})$

2) $\sqrt{32}$ $4\sqrt{2}$ $(\sqrt{16}\cdot\sqrt{2})$

3) $\sqrt{125}$ $5\sqrt{5}$ $(\sqrt{25}\cdot\sqrt{5})$

4) $\sqrt{128}$ $8\sqrt{2}$ $(\sqrt{64}\cdot\sqrt{2})$

5) $\sqrt{600}$ $10\sqrt{6}$ $(\sqrt{100}\cdot\sqrt{6})$

6) $\sqrt{80}$ $4\sqrt{5}$ $(\sqrt{16}\cdot\sqrt{5})$

7) $\sqrt{108}$ $6\sqrt{3}$ $(\sqrt{36}\cdot\sqrt{3})$

8) $\sqrt{75}$ $5\sqrt{3}$ $(\sqrt{25}\cdot\sqrt{3})$

Wednesday, September 28

- Review simplifying radicals
- Copy down an easier method....
- Changing a mixed radical to an entire radical
- Classwork

Reminder: Quiz tomorrow on Radicals (see side board)

If you have trouble simplifying radicals, then simplify using the following steps (more steps, but will work every time):

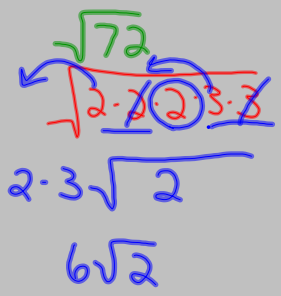
1. Break the number up into a factor tree (all prime factors)

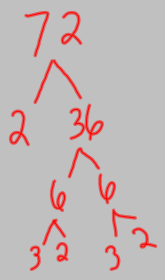
2. Put all the prime factors under the radical sign.

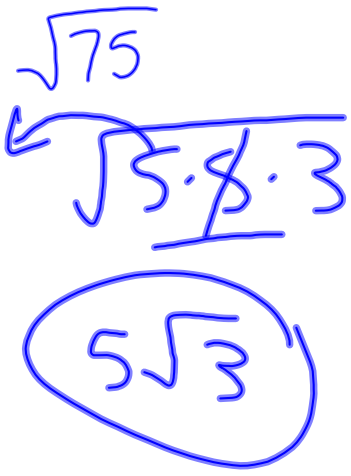
3. For every pair of factors that are the same, take one out and cancel the other.

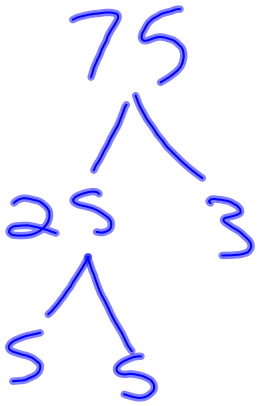
4. Multiply all the numbers that you took out and put that number before the radical sign.

5. Multiply all the numbers that you didn't take out or cancel and place that number under the radical sign.









Example using the method on the previous page:

$\sqrt{450}$ Step #1 450

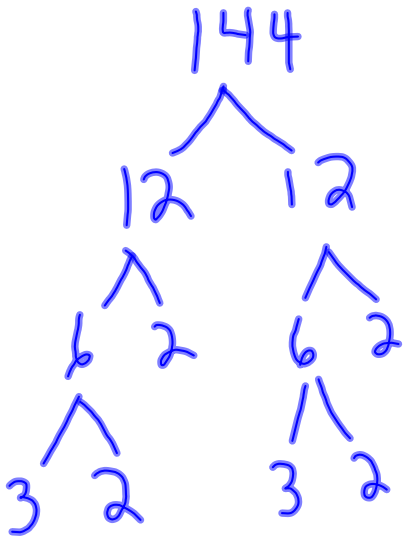
Step #2 + Step #3 Step #4 + Step #5

ANSWER → $\sqrt{450}$ =

$\sqrt[3]{144}$

$3\sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3}$

$2\sqrt[3]{18}$



Change to an entire radical:

$2\sqrt{3}$ $\sqrt{2\cdot 2\cdot 3} = \sqrt{12}$

$\sqrt{4\cdot 3}$

$= \sqrt{12}$

$7\sqrt{3}$

$\sqrt{7\cdot 7\cdot 3}$

$\sqrt{\quad}$

$4\sqrt[3]{3}$

$\sqrt[3]{4\cdot 4\cdot 4\cdot 3}$

$= \sqrt[5]{192}$

Practice Questions:

Page 218 #4abg, 5ab, 11gi, 12ij